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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/889,574	01/29/2004	Guocheng Wang	65456/80776	1693

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EXAMINER

BELL, BRUCE F

ART UNIT PAPER NUMBER

1746

DATE MAILED: 09/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/889,574

Applicant(s)

WANG, GUOCHENG

Examiner

Bruce F. Bell

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— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 135). Any reply received by the United States Patent and Trademark Office within the time period for reply may reduce any earned patent term adjustment. See 37 CFR 1.104(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) \_\_\_\_ is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_.

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## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(h) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States

2. Claims 1-4, 6-9 are rejected under 35 U.S.C. 102(h) as being anticipated by Branca et al (5183545).

Branca et al disclose a composite, porous, liquid permeable article of a multilayer structure of discrete bonded layers of porous, expanded polytetrafluoroethylene (ePTFE). The composite has its interior and exterior surfaces coated with a perfluoro ion exchange polymer to render the composite hydrophilic so as to resist gas locking in aqueous media. See abstract. The diaphragm may have an asymmetric fine structure, wherein at least two of the multiple layers have different microporous structure, wherein the two or more layers have specific gravities which differ by at least 5%. The asymmetric diaphragm is oriented so that in the two or more layers, the layer of lower specific gravity is closer to the anode side of the cell and the layer of higher specific gravity is closer to the cathode side of the cell. See col. 8, lines 56-64. The multilayer structure of discrete bonded ePTFE layers is relatively thick and is preferably greater than 5 mil thick and the layered structure provides a small pore size and uniformity of structure not attainable in monolithic ePTFE structures. By coating the interior and exterior surfaces of this structure with a perfluoro ion exchange resin of equivalent weight of less than 1000, hydrophilicity of the resulting composite can be greatly increased, thereby drastically reducing

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the composites tendency to entrain gas in the pores. See col. 9, line 64 – col. 10, line 1-9. The asymmetric structure is oriented in a chlor-alkali cell so that the larger pore size faces the anode compartment. In this mode, a higher current efficiency is achieved. This is probably because the linear velocity of the electrolyte in the direction of the cathode, increases as the electrolyte moves through the diaphragm and its effect on counteracting the back migration of the hydroxyl ion is correspondingly enhanced. See col. 11, lines 11-21. The ePTFE sheeting having a microstructure characterized by a series of nodes interconnected by fibrils and having a Gurley air flow of 0.8 sec to 27 sec, thickness between 0.2 mil and 10 mil, methanol bubble point between 0.7 psi and 40 psi is wound around a cylindrical mandrel. See col. 11, lines 51-57. The layers of ePTFE sheeting are bonded together by immersion in a molten salt bath at a temperature above the crystalline melt point of the ePTFE and is allowed to cool slowly on the mandrel in air.

The prior art of Branca et al anticipates the applicants instant invention as set forth above with respect to the instant claims. The Branca et al patent sets forth a multilayer composite membrane having at least two layers of distinctly different porosity where the greater porosity is against the anode and the lesser porosity is against the cathode, so that the current efficiency is higher and so that the linear velocity of the electrolyte in the direction of the cathode, increases as the electrolyte moves through the diaphragm. The invention further discloses the thickness of the membrane and the Gurley air flow and the methanol bubble point, all of which indicate that the pore diameter and layer thickness of the diaphragm are in the same range as the applicants instant invention, absent evidence to the contrary. Therefore, the prior art of Branca et al anticipates the applicants instant invention for the reasons set forth above.

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*Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Branca et al (5183545) in combination with Dong et al (4921587).

Branca et al is as disclosed above in the 35 USC 102 rejection above.

Branca et al does not disclose the use of polypropylene.

Dong et al discloses a multilayer diaphragm for use in electrolytic cells wherein polytetrafluoroethylene, polyamides, polypropylene, polychylene, polyester fabric, fluorinated ethylenepropylene, polychlorotrifluoroethylene, polyvinyl fluoride and polyvinylidene fluoride may be used as the multilayer portions of the diaphragm and that the individual layers have different porosities. See col. 5, line 65 – col. 6, line 20; col. 7, line 40 – col. 8, line 3. Examples 1-3 show that the diaphragm of the invention is placed between the anode and the cathode.

The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the instant invention was made because even though the prior art of Branca et al does not disclose that propylene may be used in the making of a multilayer diaphragm, the prior art of Dong et al shows that it is known to the person having ordinary skill in the art to use such a material in combination with PTFE or in place of PTFE. Therefore, the person having ordinary skill in the art would have the ability and know how to replace one equivalent material for another to achieve the same attributes as in the Branca et al diaphragm. Therefore, the prior

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art of Branca et al in combination with Dong et al render the applicants instant invention obvious for the reasons set forth above.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 9 is vague and indefinite with respect to the frame being a part of the electrolytic cell. It is unclear to the examiner as to whether the frame is a part of the diaphragm or a part of the cell. Since the instant claims says it is to the electrolytic cell it appears that the diaphragm is not being further limited. If this should not be the case and the frame is a part of the diaphragm, then a more positive recitation is requested. This claim has been examined with the frame not being a part of the diaphragm.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bruce F. Bell whose telephone number is 571-272-1296. The examiner can normally be reached on Monday-Friday 6:30 AM - 3:00 PM.

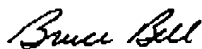
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on 571 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BFB  
September 4, 2006

  
Bruce F. Bell  
Primary Examiner  
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